

CLAIMS

1. A liquid crystal display apparatus,
comprising:

5 at least one polarization plate,
 a phase difference plate,
 a pair of oppositely disposed substrates at
least one of which is a transparent substrate,
 a liquid crystal disposed between said pair of
10 substrates, and

means for applying a voltage to said liquid
crystal so that a retardation of said liquid crystal
is modulated depending on the voltage applied to said
liquid crystal,

15 wherein said liquid crystal is placed in a
first alignment state which is determined by said pair
of substrates when the voltage is not applied thereto,

 wherein said phase difference plate has a
retardation so that light passing through said liquid
20 crystal, said phase difference plate, and said
polarization plate assumes chromatic color when the
voltage is not applied to said liquid crystal, and

 wherein said liquid crystal is placed in a
second alignment state in which said liquid crystal is
25 aligned obliquely compared with the first alignment
state so that the retardation of said liquid crystal
cancels the retardation of said phase difference plate

when the voltage is applied to said liquid crystal.

2. An apparatus according to Claim 1, wherein,
when a voltage having a value which is not more than a
5 predetermined value is applied to said liquid crystal,
the retardation of said liquid crystal is modulated in
a hue change range in which the light passing through
said liquid crystal, said phase difference plate, and
said polarization plate assumes chromatic color and a
10 hue of the chromatic color is changed depending on the
applied voltage and, when a voltage having a value
which is not less than the predetermined value is
applied to said liquid crystal, the retardation of
said liquid crystal is modulated in a light brightness
15 change range in which a brightness of the light
passing through said liquid crystal, said phase
difference plate, and said polarization plate is
changed depending on the applied voltage.

20 3. An apparatus according to Claim 2, wherein the
voltage having the predetermined value is a voltage
for effecting white display.

4. An apparatus according to Claim 2, wherein
25 said apparatus effects black display when a maximum
voltage which is not less than the voltage having a
predetermined value is applied.

5. An apparatus according to Claim 2, wherein
said apparatus has a first area in which the
retardation of said liquid crystal is modulated over
5 the hue change range wherein the hue of the chromatic
color is changed depending on the applied voltage
having the value which is not more than the
predetermined value and the brightness change range
wherein the brightness is changed depending on the
10 applied voltage having the value which is not less
than the predetermined value, and a second area in
which a color filter is provided and the retardation
of said liquid crystal is modulated in the hue change
range wherein the brightness is changed depending on
15 the applied voltage having the value which is not less
than the predetermined value.

6. An apparatus according to Claim 1, wherein the
unit pixel is constituted by a plurality of sub-pixels
20 including a first sub-pixel at which the retardation
of said liquid crystal is modulated over the hue
change range wherein the light passing through said
liquid crystal, said phase difference plate, and said
polarization plate assumes the chromatic color and the
25 hue of the chromatic color is changed and a brightness
change range wherein the light assumes achromatic
color and a brightness of the achromatic color is

changed, and a second sub-pixel at which a color filter is provided and the retardation of said liquid crystal is changed in the brightness change range wherein the brightness of the light passing through 5 said liquid crystal, said phase difference plate, and said polarization plate is changed.

7. An apparatus according to Claim 6, wherein the chromatic color at the first sub-pixel when the 10 voltage is not applied to said liquid crystal is blue or bluish green.

8. An apparatus according to Claim 7, wherein the color filter provided at the second sub-pixel is a 15 green color filter.

9. An apparatus according to Claim 8, wherein at the first sub-pixel, a color filter of color complementary to green.

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10. An apparatus according to Claim 6, wherein the chromatic color at the first sub-pixel when the voltage is not applied to said liquid crystal is green.

25 11. An apparatus according to Claim 10, wherein the color filter provided at the second sub-pixel is a red color filter.

12. An apparatus according to Claim 11, wherein at the first sub-pixel, a color filter of color complementary to red.

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13. An apparatus according to Claim 1, wherein said liquid crystal has a voltage range in which a change ratio of the retardation to a temperature is substantially zero.

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14. An apparatus according to Claim 1, wherein said phase difference plate has a biaxial refractive index.

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15. An apparatus according to Claim 14, wherein said phase difference plate has refractive indices n_x , n_y and n_z satisfying:

$$n_x > n_z > n_y,$$

wherein n_x represents a refractive index of said phase difference plate in an optical axis direction, n_y represents a refractive index in a direction perpendicular to the optical axis in a plane of said phase difference plate, and n_z represents a refractive index in a thickness direction of said phase difference plate.